Claims:

1. (original) A sensor comprising:

a) a sensor head package containing a micromachined accelerometer comprising:

i) a base layer;

ii) an frame connected to and above said base layer;

iii) a proof mass within said frame;

iv) a flexure connecting said proof mass to said frame, said flexure including a piezoresistive element; and

v) a silicon encapsulation layer above said frame, said proof mass and said flexure, wherein said proof mass and said flexure are released from said base layer and from said encapsulation layer after deposition of said encapsulation layer; and

b) circuitry electrically connected to said piezoresistive element and remotely disposed from said sensor head package.

2. (original) The sensor of claim 1, wherein a largest linear dimension of said sensor head package is less than about 0.5 mm.

3. (original) The sensor of claim 1, wherein said sensor head package is configured for implantation into a middle ear.

4. (original) The sensor of claim 3, wherein said sensor head package is configured as a replacement for one or more ossicular bones.

5. (original) The sensor of claim 1, wherein said sensor head package includes a barb.

6. (original) The sensor of claim 1, wherein said sensor head package has a pointed tip.

7. (original) The sensor of claim 6, further comprising a flexible needle shaft having an end affixed to a surface of said sensor head package facing away from said pointed tip.

8. (original) The sensor of claim 7, further comprising at least one wire running along said shaft and connecting said sensor head package to said circuitry.

9. (original) The sensor of claim 1, further comprising a passivation layer disposed on said piezoresistive element.

10. (original) The sensor of claim 1, wherein said flexure is coated with a passivation layer.

11. (original) The sensor of claim 1, wherein said proof mass is substantially rectangular.

12. (original) The sensor of claim 1, further comprising a bond pad disposed on top of said encapsulation layer and substantially laterally aligned with said proof mass.

13. (original) The sensor of claim 1, wherein a gap separating said proof mass from said frame is about 2 microns.

14. (original) The sensor of claim 1, wherein said base layer has a thickness of about 200 microns.

15. (original) The sensor of claim 1, wherein said proof mass includes holes.

16. (original) The sensor of claim 1, further comprising an electrically isolated vertical contact within said encapsulation layer.

17. (original) The sensor of claim 1, wherein said sensor head package does not include any electrical circuit element other than a resistor, a capacitor, or an inductor.

18. (withdrawn) A method of fabricating a sensor, the method comprising:

a) depositing an accelerometer layer above a base layer;

b) defining a frame, a proof mass and a flexure in said accelerometer layer, said proof mass being within said frame and said flexure connecting said proof mass to said frame;

c) defining a piezoresistive element in said flexure;

d) depositing a silicon encapsulation layer above said frame, said proof mass and said flexure;

e) releasing said flexure and said proof mass from said base layer and from said encapsulation layer to provide a micromachined accelerometer, said releasing performed after said depositing a silicon encapsulation layer;

f) packaging said micromachined accelerometer within a sensor head package; and

g) positioning circuitry remotely from said sensor head package, wherein said circuitry is electrically connected to said piezoresistive element.

19. (withdrawn) The method of claim 18, wherein a largest linear dimension of said sensor head package is less than about 0.5 mm.

20. (withdrawn) The method of claim 19, wherein said releasing comprises vapor-HF etching.

21. (withdrawn) The method of claim 20, further comprising passivating said piezoresistive element by thermal oxidation.

22. (withdrawn) The method of claim 18, further comprising passivating said accelerometer by thermal oxidation subsequent to said releasing.

23. (withdrawn) The method of claim 18, wherein said proof mass is substantially rectangular.

24. (withdrawn) The method of claim 18, further comprising depositing a bond pad on top of said encapsulation layer and substantially laterally aligned with said proof mass.

25. (withdrawn) The method of claim 18, wherein a gap separating said proof mass from said frame is about 2 microns.

26. (withdrawn) The method of claim 18, further comprising thinning said base layer to a thickness of about 200 microns.

27. (withdrawn) The method of claim 18, wherein said sensor head package does not include any electrical circuit element other than a resistor, a capacitor, or an inductor.

Detailed action: restriction requirement

Claims 1-17 (Group I) stand elected and claims 18-27 (Group II) stand withdrawn, per the election made with traverse in the reply of 7/25/05.

Examiner has made this restriction requirement final in the present office action. For the record it is noted that the stated basis of the restriction requirement of 6/23/05 was "the process as claimed can be used to make a materially different product such as a pressure sensor or a flow rate sensor". Applicant's traversal of 7/25/05 pointed out that the process as claimed **cannot** be so used, since process claim 18 is explicitly limited to accelerometers and thereby is not applicable to pressure sensors or flow rate sensors.

In making the restriction requirement final, Examiner has indicated that the traversal is unpersuasive **because** the claims of groups I and II are separately classified. However, a proper restriction requirement must also establish that two or more independent or distinct inventions are claimed. Applicant holds that the record thus far does not establish that two or more distinct or independent inventions are claimed, and accordingly requests reconsideration of the restriction requirement.

Detailed action: claim rejections under 35 USC 102

Claims 1, 3-12 and 16-17 stand rejected under 35 USC 102(b) as anticipated by US 5,531,787, hereinafter Lesinski.

With respect to independent claim 1, Applicant respectfully traverses this rejection. Claim 1 recites "wherein said proof mass and said flexure are released from said base layer and from

said encapsulation layer after deposition of said encapsulation layer". This limitation is neither taught nor suggested by Lesinski. In fact, Lesinski does not explicitly discuss the fabrication sequence of his sensor at all. In the present invention, release after encapsulation is a specific structural and methodological feature which provides numerous advantages, such as increased yield and reduced cost, that are not provided by Lesinski. Since release after encapsulation entails separation of the proof mass from surrounding features (to permit motion) after the proof mass is "buried" by the encapsulation layer, special measures are required to perform such releasing. These special measures are discussed in detail in the present application. In contrast, Lesinski has no discussion of such special fabrication methods. Accordingly, it is fair to regard the sensor of Lesinski as a sensor where release is performed before encapsulation (the conventional fabrication method). Such a sensor does not anticipate (or render obvious) the sensor of claim 1.

Claims 3-12 and 16-17 depend from claim 1, so the above arguments with respect to claim 1 are also applicable to these claims. Additional comments pertaining to some of these claims follow.

The further limitation of claim 4 to a sensor head package configured as a replacement for one or more ossicular bones is neither taught nor suggested by Lesinski. The sensor of Lesinski is shown as attached to an ossicular bone (e.g., on Fig. 5 of Lesinski), which is not the limitation of claim 4.

The further limitation of claim 5 to a sensor head package having a barb is neither taught nor suggested by Lesinski. The

office action draws attention to wire 36 of Fig. 5 of Lesinski, but this is not a barb on the sensor head package. Instead, wire 36 is a wire for attaching the sensor head package to an ossicular bone (column 11, lines 5-6).

The further limitation of claim 6 to a sensor head package having a pointed tip is neither taught nor suggested by Lesinski. The office action draws attention to wire 36 of Fig. 5 of Lesinski, but this is not a pointed tip on the sensor head package. In fact, the sensor package of Lesinski is generally block-shaped (e.g., as shown on Fig. 5).

The further limitation of claim 7 to a sensor head package having a needle shaft is neither taught nor suggested by Lesinski. The office action draws attention to wire 36 of Fig. 5 of Lesinski, but this is not a needle shaft on the sensor head package. In fact, the sensor package of Lesinski is generally block-shaped.

The further limitation of claim 12 to a bond pad laterally aligned with the proof mass is neither taught nor suggested by Lesinski. The bond pad of Lesinski is not laterally aligned with the proof mass.

Detailed action: claim rejections under 35 USC 103

Claims 2 and 13-15 stand rejected under 35 USC 103(a) as unpatentable over Lesinski in view of US 6,389,899, hereinafter Partridge.

Claims 2 and 13-15 depend from claim 1, so the above arguments with respect to claim 1 are also applicable to these claims.